

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Winter 2018 - 19 Examination

Semester: 1
Subject Code: 203208101
Subject Name: Theory of Machining Science

Date: 10/12/2018
Time: 10:30am to 01:00pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1** A) With the help of a neat sketch, describe a single point cutting tool with all necessary angles. Give the reasons why rake angle and clearance angles are required. **(05)**
 B) Discuss the effect of setting the tool above, below and at centre of the axis of the workpiece. **(05)**
 C) Write short note on cutting tool materials. Why is it necessary to use coolants while cutting? **(05)**
- Q.2** **Answer the following questions.** (Attempt any three) (Each five mark) **(15)**
 A) Write short note on tool wear. Draw the sketches of different types of tool wear.
 B) Prove that: $\tan \Phi = r \cos \alpha / (1 - r \sin \alpha)$ where, Φ = Shear plane angle, r = Chip thickness ratio and α = Rake angle.
 C) The following data were recorded while turning a workpiece on a lathe: Cutting speed = 30 m/min, feed rate = 0.25 mm/rev, depth of cut = 1.0 mm, tool life = 100 min. The following tool life equation is given for this operation: $VT^{0.1}f^{0.6}d^{0.3} = C$
 If the cutting speed, feed and depth of cut are all increased by 20 % each, what will be its effect on the tool life?
 D) Draw the Merchant's circle diagram and show all the forces. Why is it necessary to measure the different forces associated while metal cutting?
- Q.3** A) In orthogonal turning of a 60 mm dia., mild steel bar on a lathe, following data were obtained: rake angle = 12° , cutting speed = 90 m/min, feed = 0.2 mm/rev, cutting force = 160 kg, feed force = 70 kg. Calculate the shear plane angle, coefficient of friction, cutting power, the chip flow velocity, and shear force, if chip thickness is 0.25 mm. **(07)**
 B) Explain Centreless grinding process with its applications. **(08)**
- OR**
- B) Prove the expression for economics of machining based on minimum production cost. **(08)**
- Q.4** A) State the applications of unconventional machining processes? **(07)**
 Explain working principle of AJM with the help of neat sketch. Also state the applications.
- OR**
- A) How grinding wheels are specified? Take any suitable example and explain. **(07)**
 What is the effect of grit size on the surface finish?
 B) Explain working principle of LBM with the help of neat sketch. Also state the advantages and disadvantages of the process. **(08)**